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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,293	07/25/2003	Hardayal Singh Gill	HSJ920030029US1	2375

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Hitachi Global Storage Technologies  
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5600 Cottle Road  
San Jose, CA 95193

EXAMINER

SEFER, AHMED N

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 10/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/627,293

Applicant(s)

GILL, HARDAYAL SINGH

Examiner

A. Sefer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 6-14, 16-24 and 26-52 is/are pending in the application.
- 4a) Of the above claim(s) 11-14, 21-24 and 31-34 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-10, 17-20, 27-30 and 35-43 is/are allowed.
- 6) ☒ Claim(s) 6, 16, 26 and 44-52 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ 'accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

1. The amendment filed August 8, 2005 has been entered. Claims 1-5, 15 and 25 have been cancelled and new claims 44-52 have been added.

### ***Specification***

2. The disclosure is objected to because of the following informalities: The recitation "... for conducting hot electrodes ..." of claims 46, 49 and 52, should read, "... for conducting hot electrons ...."

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 11-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 depends from a cancelled claim 4.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. ("Sato") US PG-Pub 2003/0214004 in view of Gill ("Gill") USPN 6,400,536 and Mori et al. ("Mori") US PG-Pub 2004/0257192.

Sato discloses in figs. 1, 3, 9 and 15 a spin valve transistor comprising: an emitter E/15/17; a collector C; a base B between the emitter and the collector; a spin valve including a ferromagnetic free layer structure MF/11; a self-pinned antiparallel (AP) pinned layer structure MP/7 without any pinning structure pinning the self-pinned AP pinned layer structure; and a nonmagnetic spacer layer NM/9 between the free layer structure and the AP pinned layer structure; and the base comprising at least said free layer structure, but does not specifically disclose first and second ferromagnetic AP layers having the same magnetic thickness and an APC layer interposed in between.

Gill discloses in fig. 12 a self pinned AP pinned layer structure without any pinning structure pinning the self-pinned AP pinned layer structure comprising a ferromagnetic first antiparallel (AP) pinned layer 210; a ferromagnetic second antiparallel (AP) pinned layer 212; a nonmagnetic antiparallel coupling (APC) layer 208 located between the first and second AP pinned layers; one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a positive magnetostriction; and the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to a head surface of the spin valve for self pinning the AP pinned layer structure.

Mori discloses in figs. 3 and 7 a self pinned AP pinned layer structure without any pinning structure pinning the self-pinned AP pinned layer structure comprising a ferromagnetic first antiparallel (AP) pinned layer 303/503; a ferromagnetic second antiparallel (AP) pinned layer

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305/505 having the same magnetic thickness; a nonmagnetic antiparallel coupling (APC) layer 304/504 located between the first and second AP pinned layers

Since Sato, Mori and Gill are all from the same field of endeavor, GMR devices, the teachings disclosed by Gill and Mori would have been recognized in the pertinent art of Sato. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify Sato's device by incorporating Gill's teachings so as to increase the sensitivity and the flux decay length of the device as taught by Gill. It would have been obvious to incorporate Mori's teachings, since that would improve the magnetoresistive effect of the device as taught by Mori.

6. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gill in view of Sato and Mori.

Gill discloses in fig. 6 a magnetic head assembly comprising: a write head 70; a read head 72 adjacent the write head; the read head including: ferromagnetic first and second shield layers 80/82; a self pinned AP pinned layer structure a self pinned AP pinned layer structure without any pinning structure pinning the self-pinned AP pinned layer structure comprising a ferromagnetic first antiparallel (AP) pinned layer 210; a ferromagnetic second antiparallel (AP) pinned layer 212; a nonmagnetic antiparallel coupling (APC) layer 208 located between the first and second AP pinned layers; one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a positive magnetostriction; and the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to a head surface of the spin valve for self pinning the AP pinned layer structure, but does not disclose a spin valve transistor located between the

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first and second shield layers or first and second ferromagnetic AP layers having the same magnetic thickness.

Sato discloses in figs. 1, 3, 9 and 15 a spin valve transistor comprising: an emitter E/15/17; a collector C; a base B between the emitter and the collector; a spin valve including a ferromagnetic free layer structure MF/11; a self-pinned antiparallel (AP) pinned layer structure a self pinned AP pinned layer structure without any pinning structure pinning the self-pinned AP pinned layer structure MP/7; and a nonmagnetic spacer layer NM/9 between the free layer structure and the AP pinned layer structure; and the base comprising at least said free layer structure.

Mori discloses in figs. 3 and 7 a self pinned AP pinned layer structure without any pinning structure pinning the self-pinned AP pinned layer structure comprising a ferromagnetic first antiparallel (AP) pinned layer 303/503; a ferromagnetic second antiparallel (AP) pinned layer 305/505 having the same magnetic thickness; a nonmagnetic antiparallel coupling (APC) layer 304/504 located between the first and second AP pinned layers.

Since Gill, Mori and Sato are all from the same field of endeavor, GMR devices, the teachings disclosed by Sato would have been recognized in the pertinent art of Gill. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify Gill's device by incorporating Sato's teachings so as to improve the current transmittance of the of the device as taught by Sato. It would have been obvious to incorporate Mori's teachings, since that would improve the magnetoresistive effect of the device as taught by Mori.

7. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gill in view of Sato and Mori.

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Gill discloses in figs. 3-6 a magnetic disk drive comprising: at least one magnetic head assembly 40 that has a head surface; the magnetic head assembly having a write head 70 and a read head 72; the read head including: ferromagnetic first and second shield layers 80 and 82; a housing 55; a magnetic medium supported in the housing; a support mounted in the housing for supporting the magnetic head assembly with said head surface facing the magnetic medium so that the magnetic head assembly is in a transducing relationship with the magnetic medium; a motor 38 for moving the magnetic medium; and a processor 50 connected to the magnetic head assembly and to the motor for exchanging signals with the magnetic head assembly and for controlling movement of the magnetic medium; a self pinned AP pinned layer structure a self pinned AP pinned layer structure without any pinning structure pinning the self-pinned AP pinned layer structure comprising a ferromagnetic first antiparallel (AP) pinned layer 210; a ferromagnetic second antiparallel (AP) pinned layer 212; a nonmagnetic antiparallel coupling (APC) layer 208 located between the first and second AP pinned layers; one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a positive magnetostriction; and the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to a head surface of the spin valve for self pinning the AP pinned layer structure, but does not disclose a spin valve transistor located between the first and second shield layers or first and second ferromagnetic AP layers having the same magnetic thickness.

Sato discloses in figs. 1, 3, 9 and 15 a spin valve transistor comprising: an emitter E/15/17; a collector C; a base B between the emitter and the collector; a spin valve including a ferromagnetic free layer structure MF/11; a self-pinned antiparallel (AP) pinned layer structure a self pinned AP pinned layer structure without any pinning structure pinning the self-pinned AP

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pinned layer structure MP/7; and a nonmagnetic spacer layer NM/9 between the free layer structure and the AP pinned layer structure; and the base comprising at least said free layer structure.

Mori discloses in figs. 3 and 7 a self pinned AP pinned layer structure without any pinning structure pinning the self-pinned AP pinned layer structure comprising a ferromagnetic first antiparallel (AP) pinned layer 303/503; a ferromagnetic second antiparallel (AP) pinned layer 305/505 having the same magnetic thickness; a nonmagnetic antiparallel coupling (APC) layer 304/504 located between the first and second AP pinned layers.

Since Gill, Mori and Sato are both from the same field of endeavor, GMR devices, the teachings disclosed by Sato would have been recognized in the pertinent art of Gill. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify Gill's device by incorporating Sato's teachings so as to improve the current transmittance of the device as taught by Sato. It would have been obvious to incorporate Mori's teachings, since that would improve the magnetoresistive effect of the device as taught by Mori.

8. Claims 44-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill in view of Mori and Sato as applied to claims 6, 16 and 26 above, and further in view of Ito et al. ("Ito") US PG-Pub 2004/0061984.

The combined references disclose the device structure as recited in the claims, but do not specifically disclose at least one of the AP layer being Co(50)Fe(50).

Ito discloses (fig. 2 and par. 0048) a spin valve transistor comprising at least one AP layer being Co(50)Fe(50).

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It would have been obvious to one skilled in the art at the time the invention was made to incorporate Ito's teachings since that would enhance device sensitivity as taught by Ito.

Regarding claims 45, 48 and 51, Sato discloses and the base comprising the self-pinned AP pinned layer structure and the spacer layer.

Regarding claims 46, 49 and 52, Sato discloses (figs. 3 and 4 and pars. 0014 and 0039) a barrier layer 13 located between the emitter and the base.

***Allowable Subject Matter***

9. Claims 7-10, 17-20, 27-30 and 35-43 are allowed.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (571) 272-1921.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ANS  
October 16, 2005



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